Abstract of the Disclosure

An active magnetic thrust bearing, ~~that acts~~ acting ~~in cooperation with~~ on only a single axial side of a rotor ~~that is rotatable about an axis of rotation~~, while also having an efficient permanent magnet bias for linearized and highly amplified control, ~~The active magnetic bearing~~ uses two concentric ring poles that axially face a ferromagnetic axial surface of the rotor, creating two annular axial air gaps. A permanent magnet in the stator drives a bias flux through a first path including ~~to~~ two radially spaced concentric ring poles and their air gaps, and an annular region of the rotor axially aligned between the two ring poles. The permanent magnet also drives flux through a second high-reluctance flux path in the stator, by-passing the rotor. ~~The second path has a comparable reluctance to that level of flux.~~ An electromagnetic coil in the stator ~~is wound coaxially with the axis of rotation and~~ drives a control flux in a circuit including the second path, both ring poles and axial air gaps, and the shunt. The bias and control fluxes are therefore superposed in the axial air gaps for amplified response. ~~The force generated is proportional to the square of the flux density so a small control flux can result in a large change in axial force exerted upon the rotor. The use of the bias flux also makes this response linear. Because of the inclusion of the second path with reluctance comparable to the path including the axial air gaps, the electromagnetic coil does not have to drive flux through the permanent magnet. A much higher control flux and higher force is generated from a given coil current and number of turns due to having a lower reluctance circuit. The reluctance of the shunt circuit (the 2nd Path) is high enough to prevent short-circuiting the bias flux.~~